We claim:

1. A process for carrying out a reaction between at least two fluid reactants in a reactor having a plurality of wall elements, a plurality of slot-shaped reaction spaces and a plurality of cavities for conducting a fluid heat-exchange medium there through,

a) each of said slot-shaped reaction spaces being formed between lateral surfaces of two substantially equally large and substantially right-parallelepipedal wall elements made of solid plates and wherein the wall elements are arranged interchangeably in a block within a virtual right parallelepiped, comprising

b) introducing the reactants into the slot-shaped reaction spaces from edge regions situated on the same side of the block and conducting said reactants through the reaction spaces as a reaction mixture in the same directions in parallel flows and

c) conducting the fluid heat-exchange medium through the tubular cavities extending in the interior of the wall elements to thereby obtain a desired reaction.

2. The process according to Claim 1, further comprising
supplying at least one reactant through the wall elements and is introduced into a reaction space through at least one of the lateral surfaces of the wall elements.

3. The process according to Claim 1, wherein
said reactants are introduced into the reaction spaces by a distributing medium on at least one side of the block.

4. The process according to Claim 3, further comprising supplying
the reactants by said distributing medium which is made of a solid body with groups of channels, the cross-sections of which are chosen to be so small that no spreading of flames is possible in them in the course of the supply of reactants that form an explosive mixture.

5. The process according to Claim 3, further comprising supplying the reactants by said distributing medium which is made of a packing material with a particle size and with interspaces that are chosen to be so small that no spreading of flames is possible in them in the course of the supply of reactants that form an explosive mixture.

6. The process according to Claim 1, further comprising choosing the slot width of the reaction spaces between 0.05 and 5 mm, when said reaction involves explosive reaction mixtures and choosing the slot width "s" of the reaction spaces sufficiently small in order to avoid spreading of flames.

7. The process according to Claim 1, further comprising filling the reaction spaces with granular catalyst before the reaction is carried out.

8. The process according to Claim 1, further comprising before carrying out said reaction at least partially coating the lateral surfaces of the wall elements facing towards the reaction spaces with catalyst material.

9. The process according to Claim 1, further comprising before carrying out said reaction enlarging the surface area of the lateral surfaces of the wall elements facing towards the reaction spaces by forming a profiled structure on said surfaces.

10. The process according to Claim 1, further comprising immersing the wall elements at least partially in a solvent.

11. The process according to Claim 10, wherein water is the solvent.

12. The process according to Claim 10, further comprising adding at least one stabilizing additive for countering decomposition or degradation of the reaction product to the solvent.

13. The process according to Claim 1 wherein
said reaction is the direct synthesis of hydrogen peroxide from hydrogen and oxygen or an O_2-containing gas in the presence of a catalyst containing at least one element from the 8th and/or 1st subgroups of the Periodic Table of Elements and water or water vapour.

14. The process according to Claim 1 wherein
said reaction is for the production of propenal from propene and an O_2-containing gas in the presence of a catalyst.

15. The process according to Claim 1 wherein
said reaction is for the production of acrylic acid from propene and an O_2-containing gas in the presence of a catalyst and a promoter.

16. The process according to Claim 1 wherein
said reaction is for the production of ethylene oxide or propylene oxide from ethylene or propylene, respectively, and gaseous hydrogen peroxide in the presence of an oxidic or siliceous catalyst.

17. An apparatus for carrying out a reaction between at least two fluid reactants comprising a reactor in which there are located a plurality of wall elements, a plurality of slot-shaped reaction spaces, a plurality of cavities for conducting a fluid heat-exchange medium there through,
a) the slot-shaped reaction spaces being arranged between lateral surfaces of two abutting, substantially equally large and substantially right-parallelepipedal wall elements made of solid plates and the wall elements being arranged interchangeably in a block within a virtual right parallelepiped,
b) the slot-shaped reaction spaces being able to have the reactants supplied from the same side of the block, and being oriented to guide the reaction mixture through the reaction spaces in the same directions and in parallel flows, and in that
c) the plurality of tubular cavities for conducting the fluid heat-exchange medium through the wall element being parallel to each other.

18. The apparatus according to Claim 17, further comprising
at least one feed channel for at least one reactant in each of the plurality of wall elements which feed channel leads into the reaction space through at least one of the lateral surfaces of the wall elements.

19. The apparatus according to Claim 17, further comprising
a distributing medium on at least one side of the block through which the reaction spaces are capable of being provided with the reactants.

20. The apparatus according to Claim 19,
the distributing medium is a solid body with a plurality of channels, the cross-sections of which are chosen to be sufficiently small to avoid spreading of flames in them in the course of the supply of reactants that form an explosive mixture.

21. The apparatus according to Claim 19,
the distributing medium is a packing material with a particle size and with interspaces that are chosen to be sufficiently small to avoid spreading of flames in them in the course of the supply of reactants that form an explosive mixture.

22. The apparatus according to Claim 17, wherein
the slot width ("s") of the reaction spaces amounts to between 0.05 and 5 mm, whereby in case of explosive reaction mixtures the slot width "s" of the reaction spaces is chosen sufficiently small in order to avoid spreading of flames.

23. The apparatus according to Claim 17, wherein
the reaction spaces are filled with granular catalyst.

24. The apparatus according to Claim 17, wherein
the lateral surfaces of the wall elements facing towards the reaction spaces are at least partially coated with catalyst material.

25. The apparatus according to Claim 17, further comprising
the lateral surfaces of the wall elements facing towards the reaction spaces being provided with a profiled structure for the purpose of enlarging the surface area.

26. The apparatus according to Claim 17, further comprising
the reaction spaces are covered on the narrow sides of the wall elements extending parallel to the direction of flow of the reactants by plates in which there are located openings for the feeding and drainage of a heat-carrier into the wall elements and out of the wall elements.

27. The apparatus according to Claim 26, further comprising
in said plates there are located further openings for feeding at least one of the reactants into the wall elements and the wall elements are each provided with at least one feed channel which leads via a discharge opening into one of the reaction spaces.

28. The apparatus according to Claim 26, further comprising
said wall elements are each provided with a group of cavities which extend parallel to the lateral surfaces of the wall elements and are closed at their ends by the plates which are mounted onto the narrow sides of the wall elements and in which the openings for the heat-exchange medium which are in alignment with the cavities are located.

29. The apparatus according to Claim 26, further comprising
the plates are provided on their outsides and ahead of the openings with flow channels extending at right angles to the wall elements for at least one of the reactants and/or the heat-carrier.

30. The apparatus according to Claim 27, further comprising
the plates are provided on their outsides and ahead of the openings with flow channels extending at right angles to the wall elements for at least one of the reactants and/or the heat-carrier.

31. The apparatus according to Claim 29, further comprising
the plates are covered on their outsides facing away from the wall elements by a distributing body in which the flow channels are located into which the openings in the plates lead.

32. The apparatus according to Claim 30, further comprising
the plates are covered on their outsides facing away from the wall elements by a distributing body in which the flow channels are located into which the openings in the plates lead.

33. The apparatus according to Claim 17, wherein
the wall elements are accommodated as a block in a pressure vessel.

34. The apparatus according to Claim 19, further comprising
the pressure vessel possesses a lid with a partition and two connecting sockets for the feeding of two reactants, said partition being capable of being mounted onto the distributing medium.

35. The apparatus according to Claim 33, further comprising
the pressure vessel possesses a lid with a partition and two connecting sockets for the feeding of two reactants, said partition being capable of being mounted onto the distributing medium.

36. The apparatus according to Claim 17,
wherein the slot width ("s") of the reaction spaces can be changed by varying the thickness of spacers.